1999

Wayne County Test Hole Logs

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WAYNE COUNTY
Test-Hole Logs

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UNIVERSITY OF NEBRASKA-LINCOLN

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Publication and price lists are furnished upon request.

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INTRODUCTION

In 1930, the Conservation and Survey Division of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs of all the test holes drilled in the county under the program as well as those drilled by the Conservation and Survey Division with financial assistance from other government agencies.

The map in this report shows the location of all test holes drilled in the county since 1930.

Present techniques of test-hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. Beginning in September 1951, the test holes have been logged electrically. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588.

This publication is one of a series being issued to make more readily available the record of test holes drilled since 1930. The series of publications is made on a county basis and includes, with some exceptions, logs of all test holes drilled in each of the counties. The logs have not been reviewed for conformance with editorial standards and nomenclature.

The method whereby the altitude of the land surface at testhole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = instrument leveling, t = estimated from topographic map.

The test-hole records accurately reflect subsurface conditions only at the locations where the test holes were drilled. Interpretive data reflecting probable subsurface conditions between test-holes are being compiled for publication in county reports and are available for inspection in the office of the Conservation and Survey Division.

Each test hole is identified by a number assigned in the field (for example #3-B-67, #41-79), and most are also identified by a number indicating its location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 1, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole
within the quarter-quarter section. No number is shown unless more than one test hole is within the given quarter-quarter section.

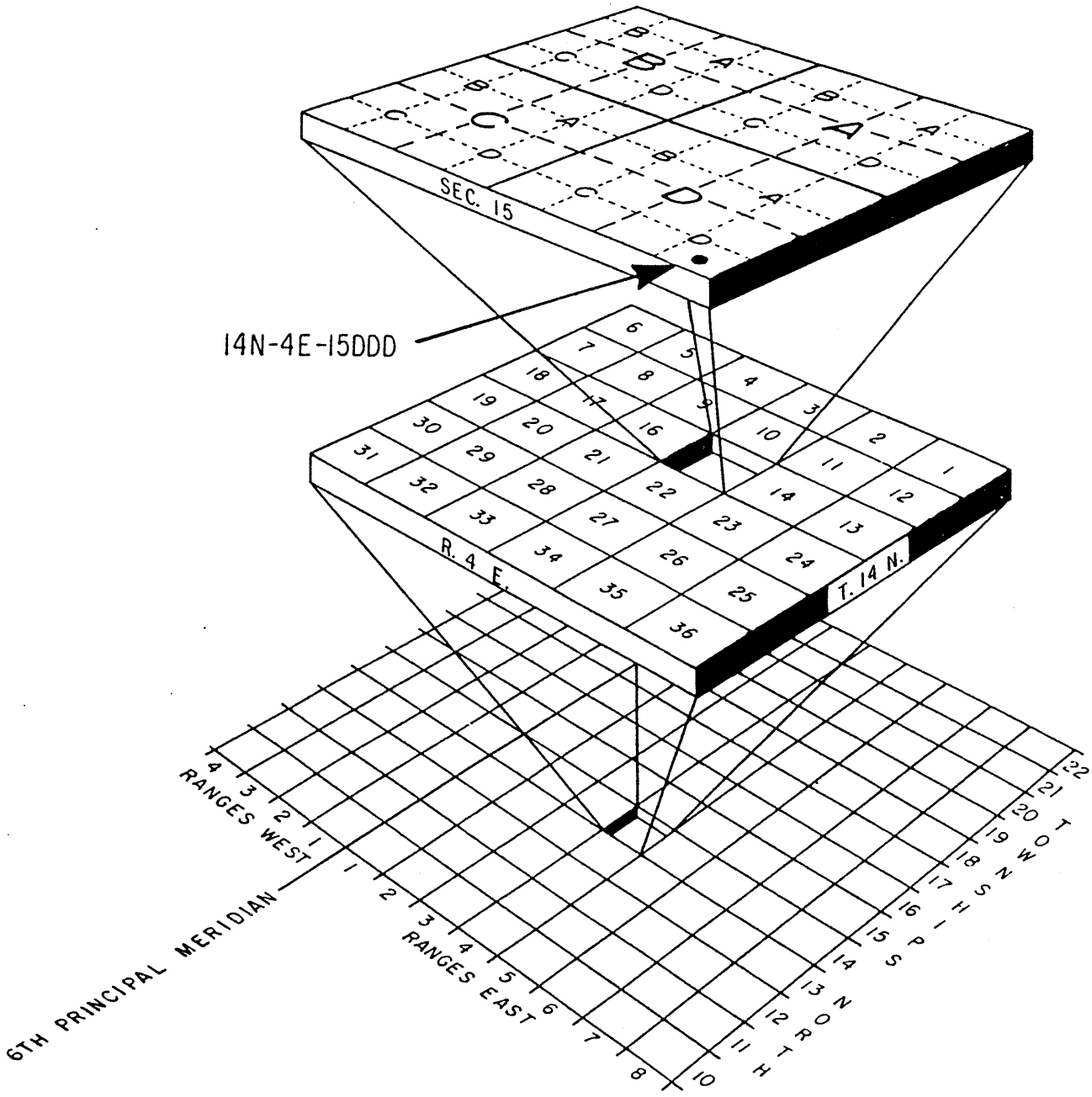

Fig. 1. System for identifying test-holes according to their location.

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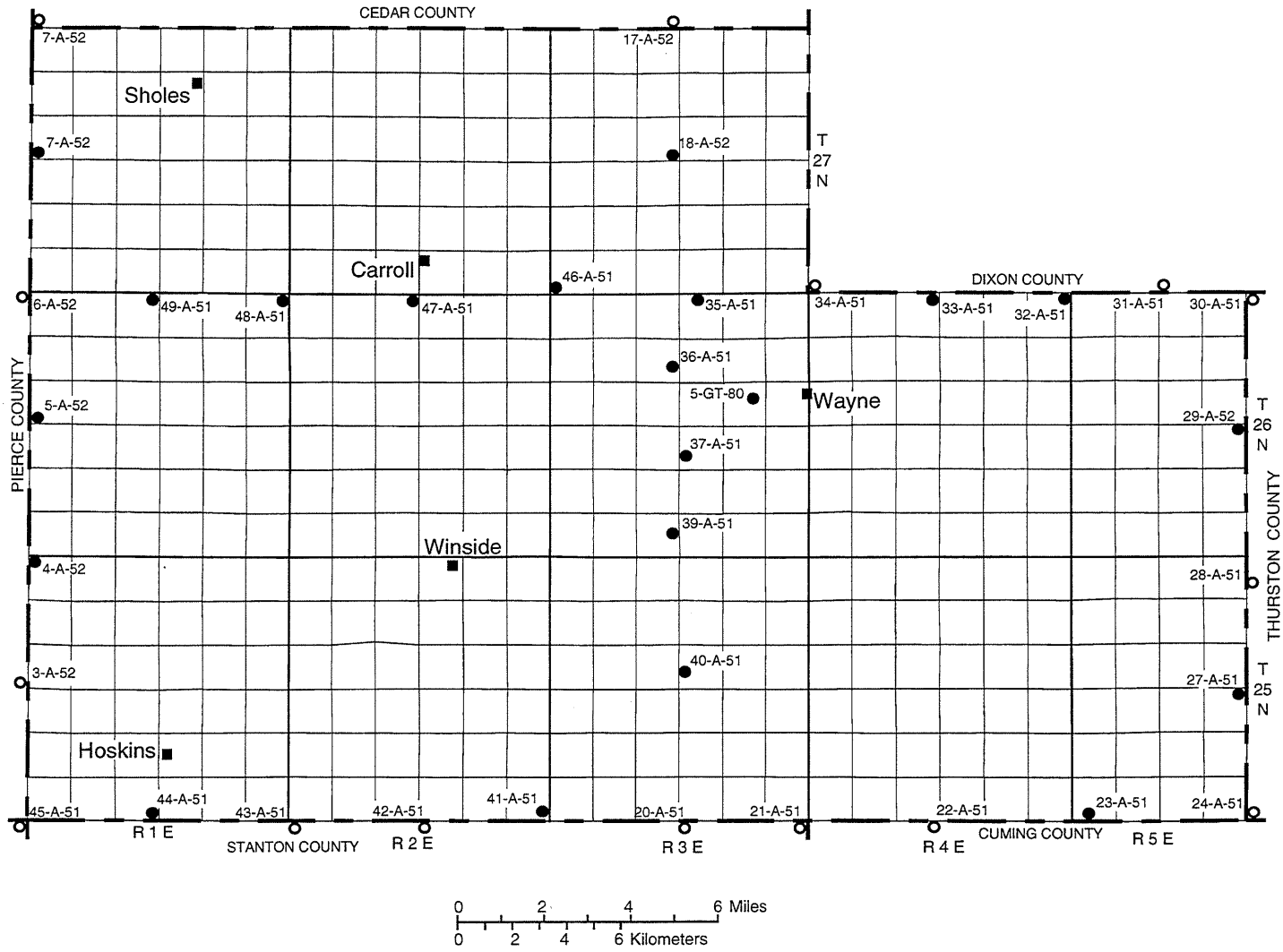
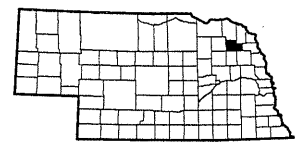


● Test hole description published in this report

○ Test hole description published in other report



County Location Map

Fig. 2. Test-hole location map of Wayne County.

Test Hole #4-A-52
(25N-1E-6bbbb)
Wayne County

Location: NW NW NW NW Sec. 6, T. 25 N., R. 1 E., approximately 10 feet south and 67 feet east of northwest corner.
Ground elevation: 1,822 ft. (t). (Norfolk NE, 7.5 min quadrangle)
Depth to water: 20.7 ft. (7-3-52)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very sandy, medium gray; contains very fine to medium sand	0.0	5.0
Clay, silty, to silt, clayey; medium yellowish gray; contains a trace of fine sand	5.0	6.0
Clay, very silty, medium yellowish gray	6.0	8.5
Silt, moderately clayey, medium brownish gray with iron stain; slightly calcareous below 14.8 ft	8.5	26.0
Silt, slightly clayey, slightly calcareous, medium gray; contains wood fragments from 40 to 50 ft	26.0	63.0
Silt, moderately clayey, dark brownish gray; slightly sandy below 65 ft	63.0	68.0
Till; clay, silty to gravelly, moderately calcareous, light gray	68.0	84.5
Sand and gravel, slightly calcareous; contains till from 85 to 87.5 ft	84.5	90.0
Till; clay, silty to gravelly, moderately calcareous, light yellowish gray; medium gray below 170 ft	90.0	200.0
Clay, slightly to moderately silty, slightly calcareous, medium gray; very silty from 205 to 207 ft; moderately calcareous below 207 ft	200.0	210.0
Till; clay, silty to gravelly, moderately calcareous, medium yellowish gray	210.0	220.0
Sand, quartz and some pink feldspar, texture grades from very fine to medium with a trace of coarse; fine to coarse below 235 ft; contains some silt from 273 to 275 ft	220.0	280.0
Sand, fine to very coarse with a trace of fine gravel; fine to coarse from 300 to 327.5 ft	280.0	330.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, texture grades from very fine to fine	330.0	376.0
Cretaceous System - Upper Cretaceous Series - Colorado Group: Niobrara Formation:		
Chalk, light yellow to white	376.0	400.0

Test Hole #44-A-51
(25N-1E-33dddd)
Wayne County

Location: SE SE SE SE Sec. 33, T. 25 N., R. 1 E., approximately 9 feet north and 290 feet west of southeast corner.
Ground elevation: 1,701 ft. (t). (Hoskins, 7.5 min quadrangle)
Depth to water: 26.0 ft. (10-26-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly calcareous, medium yellowish gray....	0.0	0.5
Silt, slightly clayey, moderately calcareous, medium brownish yellow.....	0.5	40.0
Silt, slightly clayey, medium gray to black.....	40.0	49.0
Silt, moderately clayey to moderately sandy, medium gray; contains very fine to medium sand; contains some gravel below 53 ft.....	49.0	57.0
Sand and gravel, dark colored silicates and limy fragments; texture grades from fine sand to fine gravel.....	57.0	59.0
Silt, moderately clayey to moderately sandy, medium gray.....	59.0	67.0
Till; clay, silty to sandy and pebbly, moderately calcareous, light gray with iron stain; medium gray below 80 ft.....	67.0	170.0
Silt, slightly clayey, moderately calcareous, medium gray; contains some fine to medium sand below 175 ft.....	170.0	180.0
Till; clay, silty to sandy and gravelly, slightly calcareous, medium gray.....	180.0	195.0
Sand and gravel, slightly calcareous.....	195.0	196.4
Till; silt, clayey to sandy and gravelly, slightly calcareous, medium gray.....	196.4	222.0
Sand, silty, to silt, sandy; medium bluish green, contains very fine to fine sand with some medium to coarse sand.....	222.0	224.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, quartz and light colored silicates, texture grades from very fine to medium with some coarse to very coarse.....	224.0	230.0
Sand, texture grades from very fine to fine with some medium; contains green silty from 232 to 233 ft and 234.5 to 235 ft.....	230.0	235.0
Silt, sandy, medium green; contains very fine sand..	235.0	237.5
Sand, greenish gray, texture grades from very fine		

to fine	237.5	240.0
Sand and silt, light green; sand is very fine	240.0	245.0
Silt, sandy, in part clayey, light greenish gray; contains very fine sand	245.0	250.0
Sand, silty, light greenish gray; texture of sand grades from very fine to fine	250.0	252.0
Silt, sandy, to sand, silty; slightly clayey, light brown; contains very fine to fine sand	252.0	285.0
Silt, sandy, light green, contains very fine sand	285.0	295.0
Sand, light grayish green, texture grades from very fine to fine; contains a thin layer of clayey silt	295.0	300.0
Silt, sandy, to sand, silty; light grayish green; contains very fine sand	300.0	322.0
Clay, sandy, to silt, sandy; light green; contains very fine sand	322.0	324.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, clayey, slightly calcareous, light yellowish gray; white to light gray from 327 to 329 ft, moderately calcareous; light to medium gray, contains thin chalk layers below 329 ft	324.0	340.0

Test Hole #41-A-51
(25N-2E-36ddda)
Wayne County

Location: NE SE SE SE Sec. 36, T. 25 N., R. 2 E., approximately 398 feet north and 10 feet west of southeast corner.
Ground elevation: 1,601 ft. (t). (Wayne SW, 7.5 min quadrangle)
Depth to water: 45.2 ft. (10-26-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Silt, slightly clayey, dark grayish brown; slightly calcareous and medium yellowish gray below 3.5 ft; moderately calcareous below 8 ft; slightly to moderately clayey below 16 ft	1.0	39.0
Silt, slightly clayey, moderately calcareous, medium brown	39.0	41.0
Silt, moderately calcareous, medium olive gray	41.0	42.5
Silt, medium brown	42.5	44.7
Silt, medium olive gray	44.7	46.7
Silt, slightly clayey, dark gray	46.7	50.0
Silt, moderately clayey, dark grayish brown	50.0	51.5
Clay, very silty, medium brown; moderately silty below 55 ft	51.5	57.0
Till; silt, moderately clayey to slightly sandy, moderately calcareous, medium yellowish gray	57.0	61.0
Till; clay, slightly silty to sandy, moderately calcareous, medium brownish gray; medium gray below 107 ft	61.0	125.2
Sand, moderately calcareous; texture grades from fine to very coarse	125.2	126.0
Till; clay, silty to pebbly, moderately calcareous, medium yellowish gray; dark brownish gray below 128.5 ft; medium gray below 131 ft	126.0	195.0
Clay, silty, slightly sandy, slightly calcareous, light gray	195.0	197.0
Till; clay, silty to pebbly, moderately calcareous, medium gray	197.0	220.7
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, shaley, dark grayish brown	220.7	222.0
Shale, chalky, light to dark gray	222.0	240.0

Test Hole #40-A-51
(25N-3E-15cbcb)
Wayne County

Location: NW SW NW SW Sec. 15, T. 25 N., R. 3 E., approximately 1,940 feet north and 10 feet east of southwest corner.
Ground elevation: 1,622 ft. (t). (Wayne, 7.5 min quadrangle)
Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Soil; silt, medium brown	1.0	2.0
Silt, moderately clayey, medium yellowish brown; very clayey below 3 ft	2.0	5.0
Silt, slightly to moderately clayey, moderately calcareous, light gray, mottled brown; slightly calcareous below 39 ft	5.0	41.0
Silt, slightly clayey, light gray	41.0	43.5
Silt, slightly clayey, soil-like, dark gray	43.5	45.0
Silt, moderately clayey, light gray	45.0	45.5
Clay, very silty, to silt, very clayey; dark brownish gray to light brownish gray	45.5	56.5
Clay, very silty, medium brownish gray	56.5	60.0
Silt, very clayey, light gray with blue tint; contains a trace of sand below 62.5 ft	60.0	68.0
Silt, moderately clayey to slightly sandy, light gray with blue tint	68.0	70.0
Till; clay, silty to slightly sandy and pebbly, moderately calcareous, medium yellowish gray; medium gray below 132 ft	70.0	141.0
Till; clay, silty to sandy and pebbly, moderately calcareous, medium yellowish gray; medium gray below 150 ft	141.0	197.0
Sand and gravel, dark colored silicates, limy fragments and clay fragments; texture grades from medium sand to medium gravel	197.0	199.0
Till; clay, silty to slightly sandy and pebbly, moderately calcareous, medium gray	199.0	224.5
Clay, very silty, slightly to moderately calcareous, light gray with brown tint	224.5	235.0
Clay, very silty to slightly sandy, light gray with bluish green tint; contains fine sand	235.0	237.5
Clay, very silty, moderately calcareous, light gray with brown tint	237.5	238.8
Sand and gravel, slightly calcareous, green sili-		

cates and pink feldspar; texture grades from fine sand to medium gravel.....	238.8	240.0
Sand, slightly to moderately calcareous, texture grades from very fine to very coarse.....	240.0	259.5
Cretaceous System - Upper Cretaceous Series - Colorado Group: Niobrara Formation:		
Chalk, white with green tint.....	259.5	260.5
Shale, chalky, to chalk, shaley; light green to dark gray.....	260.5	298.0
Cretaceous System - Upper Cretaceous Series - Colorado Group: Carlile Formation:		
Shale, clayey, moderately calcareous, medium to dark gray.....	298.0	310.0

Test Hole #27-A-51
(25N-5E-22aaaa)
Wayne County

Location: NE NE NE NE Sec. 22, T. 25 N., R. 5 E., approximately 7 feet south and 130 feet west of northeast corner.
Ground elevation: 1,493 ft. (t). (Altona NE, 7.5 min quadrangle)
Depth to water: 45.8 ft. (9-6-51)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Silt, slightly to moderately clayey, medium brown; medium yellowish brown below 2 ft	1.0	2.5
Silt, slightly clayey, light brownish yellow; slightly calcareous from 7.5 to 10 ft and from 13 to 15 ft; moderately calcareous below 23 ft	2.5	37.0
Silt, slightly clayey, light gray mottled medium yellowish brown	37.0	39.0
Silt, slightly clayey, medium brown to medium yellowish brown	39.0	41.5
Clay, moderately to very silty, medium grayish brown to light brown	41.5	45.0
Silt, moderately to very clayey, medium grayish brown	45.0	51.5
Silt, very clayey, light gray with medium brown specks	51.5	53.0
Clay, very silty, light brown; contains a trace of fine to very coarse sand	53.0	58.5
Silt, clayey to sandy, light yellowish brown	58.5	60.0
Till; silt, clayey to sandy and gravelly, moderately calcareous, light brownish yellow	60.0	105.0
Silt, clayey to sandy, very calcareous, light brown; contains very fine to medium sand	105.0	105.8
Silt, slightly clayey to very sandy, light brown	105.8	108.9
Clay, very silty, medium brown; contains a trace of fine to coarse sand	108.9	109.2
Marl, white	109.2	110.0
Clay, very silty, very calcareous, light brownish gray	110.0	113.5
Sand, slightly clayey to very silty, light brown; texture grades from very fine to fine with some medium; contains some limy fragments	113.5	115.5
Sand, very silty, light brown; texture of sand grades from very fine to medium	115.5	120.0
Sand, quartz and pink feldspar, very calcareous;		

texture grades from very fine to very coarse with a trace of fine gravel	120.0	125.0
Sand, moderately silty, very calcareous, texture grades from very fine to medium with some coarse and very coarse	125.0	130.0
Sand, slightly silty, very calcareous, texture grades from very fine to coarse	130.0	135.0
Sand and gravel, very calcareous, texture grades from fine sand to fine gravel	135.0	143.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, clayey to silty, moderately calcareous, dark gray	143.5	200.0

Test Hole #23-A-51
(25N-5E-31cdcc)
Wayne County

Location: SW SW SE SW Sec. 31, T. 25 N., R. 5 E., approximately 7 feet north and 1,500 feet east of southwest corner.
Ground elevation: 1,504 ft. (t). (Altona, 7.5 min. quadrangle)
Depth to water: 42.0 ft. (8-22-51)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.5
Silt, slightly clayey, medium yellowish brown; slightly calcareous from 5 to 10 ft and below 30 ft	1.5	36.0
Silt, slightly clayey, soil-like, light brown	36.0	37.0
Clay, very silty, light brown	37.0	43.0
Silt, very clayey, light grayish yellow	43.0	45.0
Silt, slightly to moderately clayey, light grayish yellow	45.0	50.0
Silt, very clayey, light brown	50.0	65.0
Clay, very silty, light brownish gray	65.0	70.0
Silt, very clayey, light gray; moderately clayey below 80 ft	70.0	87.5
Silt, light brownish gray to light gray; contains volcanic ash; clayey below 91.5 ft	87.5	92.5
Silt, very sandy, light gray; contains very fine to fine with some medium sand	92.5	95.0
Sand and gravel, medium sand to fine gravel with a trace of medium gravel	95.0	97.0
Silt, slightly clayey to very sandy, dark brownish yellow	97.0	98.0
Sand, fine to very coarse with some fine gravel	98.0	101.0
Till; clay, slightly sandy to gravelly, moderately calcareous, light to medium gray	101.0	105.5
Silt, moderately clayey to sandy, light gray; contains very fine sand	105.5	107.5
Sand, slightly calcareous, quartz and dark colored silicates; texture grades from fine to coarse with some very coarse	107.5	110.0
Sand, very silty, interbedded with silt, very sandy; yellowish gray	110.0	112.0
Sand, very fine to coarse; contains some fine gravel below 125 ft	112.0	132.0
Till; clay, silty to sandy and gravelly, moderately calcareous, medium gray	132.0	140.0

Clay, very silty, moderately calcareous, light gray.	140.0	141.5
Till; clay, silty to sandy and gravelly, moderately calcareous, medium gray.....	141.5	184.0
Sand, slightly calcareous, quartz and dark colored and green silicates; texture grades from very fine to very coarse.....	184.0	186.0
Till; silt, clayey to slightly sandy and gravelly, moderately calcareous, medium gray.....	186.0	192.0
Till; clay, very silty to slightly sandy, slightly calcareous, light gray.....	192.0	205.0
Sand, moderately clayey to silty, slightly calcareous, medium yellowish brown; sand is very fine to fine	205.0	205.2
Clay, very silty, moderately calcareous, light gray.	205.2	208.5
Silt, very clayey, medium gray.....	208.5	209.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, clayey to silty, very calcareous, dark gray..	209.5	214.5
Limestone, dark gray with white specks, shaley.....	214.5	215.3
Shale, clayey to slightly silty, very calcareous, dark gray.....	215.3	230.0

Test Hole #48-A-51
(26N-1E-1aaad)
Wayne County

Location: SE NE NE NE Sec. 1, T. 26 N., R. 1 E., approximately 365 feet south and 10 feet west of northeast corner.
Ground elevation: 1,719 ft. (t). (Randolph South, 7.5 min. quadrangle)
Depth to water: 141.5 ft. (11-16-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and soil; silt, slightly clayey, slightly calcareous, medium brownish gray.....	0.0	1.5
Silt, slightly calcareous, medium yellowish gray....	1.5	5.0
Silt, slightly clayey, moderately calcareous, medium yellowish gray, mottled gray.....	5.0	51.5
Silt, slightly clayey, soil-like, medium brownish gray; contains a trace of sand.....	51.5	53.0
Till; silt, very clayey to moderately sandy and gravelly, moderately calcareous, medium yellowish gray with some dark brown stain; medium gray below 141.5 ft.....	53.0	158.0
Silt, moderately clayey, slightly calcareous, medium brownish gray; moderately calcareous below 160.5 ft.; medium yellowish gray below 161.5 ft.....	158.0	168.5
Silt, very clayey, moderately calcareous, medium brown; contains calcareous nodules below 170.5 ft.	168.5	172.0
Silt, slightly to moderately clayey, moderately calcareous, light yellowish gray.....	172.0	175.0
Clay, very silty, to silt, very clayey; medium brownish gray.....	175.0	178.5
Silt, very clayey, very calcareous, light brownish gray; contains calcareous nodules from 180 to 182.5 ft; slightly calcareous below 182.5 ft.....	178.5	184.5
Silt, very clayey to slightly sandy, light gray to white; contains very fine to fine sand.....	184.5	187.0
Silt, moderately clayey to slightly sandy, medium brownish gray; contains very fine to fine sand; contains coarser sand from 192 to 195 ft.....	187.0	200.0
Silt, moderately clayey to very sandy, light greenish gray; contains very fine to fine sand.....	200.0	202.5
Sand, very silty, light greenish gray; texture grades from very fine to fine.....	202.5	204.5
Silt, very clayey, in part sandy, light greenish gray; contains very fine sand.....	204.5	205.5

Sand, very fine to coarse.....	205.5	217.0
Sand, quartz and pink feldspar, texture grades from medium to very coarse with some fine gravel; coarser texture from 220 to 230 ft.....	217.0	240.0
Sand and gravel, texture grades from coarse sand to fine gravel.....	240.0	251.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, moderately silty, slightly to moderately calcareous, medium brownish yellow; contains a trace of sand.....	251.0	260.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, shaley, medium brownish yellow; in part white below 270 ft.....	260.0	290.0
Chalk, white with slight yellow stain.....	290.0	305.5
Shale, chalky, medium brownish gray to medium gray..	305.5	320.0

Test Hole #49-A-51
(26N-1E-4aaaa)
Wayne County

Location: NE NE NE NE Sec. 4, T. 26 N., R. 1 E., approximately 5 feet south and 261 feet west of northeast corner.
Ground elevation: 1,810 ft. (t). (Randolph South, 7.5 min. quadrangle)
Depth to water: 42.6 ft. (11-16-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Silt, slightly clayey, medium yellowish gray mottled gray; slightly calcareous below 5 ft	1.0	31.3
Silt, very clayey, medium brown	31.3	36.0
Till; clay, silty to slightly sandy, slightly to moderately calcareous, light yellowish gray	36.0	47.0
Till; clay, slightly silty, slightly calcareous, dark brownish gray; contains a trace of sand	47.0	56.0
Till; silt, moderately clayey to moderately sandy and gravelly, moderately calcareous, medium brown; contains fine to coarse sand	56.0	60.0
Till; silt, very sandy and gravelly, slightly calcareous, medium brown	60.0	61.7
Till; clay, moderately silty to slightly sandy, slightly calcareous, medium brownish gray; contains fine to medium sand	61.7	69.5
Till; silt, clayey to moderately sandy and gravelly, slightly calcareous, medium yellowish gray	69.5	70.0
Till; clay, silty to slightly sandy and gravelly, slightly calcareous, medium brownish gray	70.0	75.0
Clay, very silty, slightly calcareous, light to medium gray	75.0	82.5
Till; clay, silty to sandy and gravelly, slightly calcareous, medium yellowish gray; moderately calcareous below 100 ft; medium gray below 150 ft.	82.5	220.0
Sand, slightly calcareous, texture grades from very fine to very coarse	220.0	224.0
Till; clay, silty to sandy and gravelly, moderately calcareous, medium gray	224.0	263.5
Silt, slightly clayey, medium olive gray	263.5	264.5
Till; clay, silty to slightly sandy, moderately calcareous, medium gray	264.5	265.0
Silt, slightly clayey, medium olive gray	265.0	266.5
Silt, very sandy, to sand, very silty; light brown;		

contains very fine sand.....	266.5	275.0
Sand, very fine to medium with some coarse; fine to coarse below 280 ft; contains sandy silt from 320.7 to 321 ft.....	275.0	330.0
Sand and gravel, quartz and some pink feldspar, texture grades from medium sand to fine gravel.....	330.0	359.5
Clay, slightly to moderately silty, medium pinkish gray.....	359.5	370.0
Silt, very clayey, to clay, very silty; light pinkish gray.....	370.0	371.5
Silt, moderately clayey, in part slightly sandy, moderately calcareous, light gray; contains very fine sand.....	371.5	375.0
Silt, slightly sandy, moderately calcareous, light gray; moderately clayey below 380 ft.....	375.0	383.5
Silt, very clayey to moderately sandy, medium gray; contains very fine to very coarse sand.....	383.5	388.0
Sand and gravel, texture grades from fine sand to medium gravel.....	388.0	389.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, light yellow.....	389.5	400.0

Test Hole #5-A-52
(26N-1E-18cccc)
Wayne County

Location: SW SW SW SW Sec. 18, T. 26 N., R. 1 E., approximately 5 feet north and 303 feet east of southwest corner.
Ground elevation: 1,781 ft. (t). (Norfolk NE, 7.5 min. quadrangle)
Depth to water: 34.0 ft. (7-10-52)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil; silt, slightly calcareous, dark brownish gray.	0.0	0.5
Silt, slightly clayey, dark brownish gray.....	0.5	1.5
Silt, slightly clayey, moderately calcareous, medium yellowish to brownish gray.....	1.5	37.5
Clay, very silty, soil-like, dark brownish gray.....	37.5	40.0
Clay, moderately silty, granular, dark brownish gray	40.0	43.0
Silt, slightly to moderately clayey, dark brownish gray.....	43.0	45.5
Silt, slightly clayey, sandy, light bluish gray; texture of sand grades from fine to medium.....	45.5	48.5
Silt, slightly clayey to very sandy, light bluish gray; contains fine to medium sand.....	48.5	49.8
Sand and gravel, fine sand to coarse gravel.....	49.8	57.0
Till; clay, silty to gravelly, moderately calcareous, medium yellowish gray with brown stain; medium gray below 120 ft.....	57.0	140.0
Silt, slightly clayey, moderately calcareous, medium olive gray.....	140.0	142.5
Silt to sand, moderately calcareous, medium olive gray; very fine sand.....	142.5	145.0
Silt, slightly clayey, moderately calcareous, medium olive gray.....	145.0	147.5
Silt to siltstone, moderately calcareous, medium olive gray.....	147.5	148.0
Till; clay, moderately silty to sandy, moderately calcareous, medium gray.....	148.0	176.0
Silt, moderately clayey, slightly calcareous, black.	176.0	176.2
Till; clay, silty to gravelly, moderately calcareous, medium gray.....	176.2	177.5
Silt, slightly clayey, moderately calcareous, medium gray.....	177.5	178.0
Till; clay, silty to gravelly, moderately calcareous, medium gray.....	178.0	239.0
Silt, moderately clayey, slightly calcareous, light yellowish gray.....	239.0	239.7

Sand and gravel, quartz and pink feldspar; texture grades from medium sand to medium gravel; fine sand to fine gravel below 250 ft.....	239.7	270.0
Sand, fine to very coarse.....	270.0	295.0
Sand and gravel, medium sand to fine gravel.....	295.0	302.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, light yellowish gray.....	302.0	313.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk to limestone; yellow.....	313.0	315.0
Chalk, yellow to orange, in part white.....	315.0	370.0
Chalk, white to yellow.....	370.0	390.0
Shale, chalky, medium brownish gray.....	390.0	400.0

Test Hole #47-A-51
(26N-2E-4aaaa)
Wayne County

Location: NE NE NE NE Sec. 4, T. 26 N., R. 2 E., approximately 152 feet south and 21 feet west of northeast corner.
Ground elevation: 1,681 ft. (t). (Carroll, 7.5 min. quadrangle)
Depth to water: 58.2 ft. (11-2-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill; silt, moderately clayey, medium grayish brown	0.0	1.5
Soil; silt, moderately clayey, medium brown	1.5	2.5
Silt, slightly to moderately clayey, medium yellowish gray; moderately calcareous below 3.5 ft	2.5	20.0
Silt, slightly clayey, slightly calcareous, medium yellowish gray; moderately calcareous and more clayey below 25 ft	20.0	40.0
Silt, moderately clayey, medium yellowish gray	40.0	43.5
Silt, moderately clayey, soil-like, dark brownish gray	43.5	45.5
Silt, moderately clayey, medium brown	45.5	47.5
Clay, very silty, medium brown	47.5	60.0
Silt, very clayey, light brown	60.0	64.5
Silt, very clayey, to clay, very silty; light brownish gray; contains a trace of sand below 70 ft	64.5	72.5
Silt, very sandy to gravelly, light brownish gray; contains fine sand to fine gravel	72.5	73.5
Silt, slightly sandy, light brownish gray	73.5	77.5
Silt, granular, light brownish gray	77.5	80.5
Silt, medium gray	80.5	82.0
Silt, slightly to moderately sandy, medium gray	82.0	86.0
Sand and gravel, slightly calcareous, texture grades from fine sand to fine gravel	86.0	86.5
Silt, very sandy, slightly calcareous, light gray with a blue tint; contains very fine to fine sand.	86.5	90.0
Silt, slightly sandy, slightly calcareous, light gray with a blue tint; contains very fine to fine sand	90.0	93.5
Silt, slightly to moderately sandy, slightly calcareous, light gray with bluish green tint; contains very fine to medium sand	93.5	95.5
Silt, very sandy, slightly calcareous, light gray with bluish green tint; contains fine to medium sand with a trace of coarse sand	95.5	98.0

Silt, slightly sandy, light gray with bluish green tint; contains very fine sand.....	98.0	101.5
Sand and gravel, slightly calcareous, texture grades from medium sand to medium gravel.....	101.5	104.0
Till; clay, silty to gravelly, moderately calcareous, medium yellowish gray with brown stain; medium gray below 110 ft.....	104.0	135.8
Sand and gravel, silty, slightly calcareous; texture grades from fine to coarse sand with some fine gravel.....	135.8	140.0
Till; clay, silty to gravelly, moderately calcareous, medium gray.....	140.0	182.5
Sand, quartz and some pink feldspar, texture grades from fine to coarse sand with some fine gravel....	182.5	230.0
Sand and gravel, fine sand to fine gravel.....	230.0	243.0
Silt, light gray with green tint.....	243.0	246.0
Sand and gravel, medium sand to fine gravel with a trace of medium gravel; contains thin silt layers below 254.9 ft.....	246.0	260.0
Sand, fine to very coarse.....	260.0	273.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, shaley, yellow to medium gray.....	273.0	290.0

Test Hole #35-A-51
(26N-3E-3babb)
Wayne County

Location: NW NW NE NW Sec. 3, T. 26 N., R. 3 E., approximately 8 feet south and 1,350 feet east of northwest corner.
Ground elevation: 1,615 ft. (t). (Laurel SE, 7.5 min. quadrangle)
Depth to water: 48.5 ft. (9-28-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill; clay, very silty, medium brown.....	0.0	1.5
Silt, slightly clayey, medium brown; medium yellowish gray from 3 to 5 ft; slightly calcareous below 5 ft.....	1.5	43.8
Silt, slightly clayey, soil-like, medium brownish gray.....	43.8	45.0
Clay, moderately silty, medium brownish gray; medium brown and very silty below 49 ft.....	45.0	50.0
Clay, slightly silty, light brown; moderately silty below 65 ft.....	50.0	69.0
Clay, slightly to moderately silty, medium gray.....	69.0	70.2
Clay, slightly silty to slightly sandy, light yellowish gray; contains calcareous nodules to 72 ft; slightly calcareous and more sandy below 73 ft.....	70.2	74.5
Till; silt, very clayey to gravelly, moderately calcareous, light brownish gray with brown stain; contains a few pebbles, slightly calcareous below 80 ft.....	74.5	86.5
Clay, moderately calcareous, light brownish gray; contains calcareous nodules.....	86.5	92.5
Clay, very silty, very calcareous, medium brownish gray; contains some fine to medium sand; contains many calcareous fragments.....	92.5	93.5
Till; clay, silty to sandy, moderately calcareous, medium brownish gray; medium brown below 95 ft....	93.5	100.0
Till; clay, silty to sandy, moderately calcareous, light yellowish gray; contains very fine to medium sand with some gravel; slightly calcareous and medium gray below 128 ft.....	100.0	182.0
Sand, very silty, slightly calcareous, medium gray; texture grades from very fine to fine.....	182.0	186.5
Sand, quartz, green silicates and pink feldspar, texture grades from fine to very coarse; contains a trace of fine gravel below 200 ft.....	186.5	205.2

Silt, very clayey, slightly calcareous, light gray..	205.2	206.0
Sand and gravel, coarse sand to fine gravel.....	206.0	207.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, medium gray.....	207.5	217.0
Chalk, shaley, white to medium gray.....	217.0	281.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, clayey, very calcareous, medium to dark gray; moderately calcareous from 284 to 285 ft; slightly calcareous from 285 to 288 ft; noncalcareous below 288 ft.....	281.0	291.0

Test Hole #36-A-51
(26N-3E-9dada)
Wayne County

Location: NE SE NE SE Sec. 9, T. 26 N., R. 3 E., approximately 1,900 feet north and 7 feet west of southeast corner.
Ground elevation: 1,472 ft. (a). (Wayne, 7.5 min. quadrangle)
Depth to water: 5.0 ft. (9-28-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and soil; silt, slightly clayey, dark brownish gray	0.0	1.5
Silt, moderately clayey, dark brownish gray	1.5	5.0
Silt, very clayey, dark brownish gray	5.0	5.5
Clay, very silty, medium brownish gray	5.5	6.5
Silt, very clayey, medium brownish gray	6.5	7.5
Silt, slightly to moderately clayey, very calcareous, medium yellowish gray; moderately calcareous below 10 ft	7.5	15.0
Silt, very clayey to clay, very silty; medium yellowish gray to medium gray; contains a few gastropods below 27.5 ft	15.0	30.0
Silt, moderately clayey, moderately calcareous, light gray; contains a few gastropods	30.0	31.0
Silt, moderately clayey, medium yellowish gray; medium brownish gray below 32.8 ft	31.0	33.1
Silt, slightly to moderately clayey, medium gray	33.1	35.0
Silt, slightly clayey, medium gray	35.0	36.0
Gravel and sand, moderately calcareous, texture grades from coarse sand to coarse gravel	36.0	39.0
Silt, slightly clayey to moderately sandy, medium gray; contains very fine to fine with some medium sand	39.0	43.5
Silt, slightly sandy, medium gray; contains very fine to fine sand	43.5	48.0
Silt, very sandy, in part clayey, medium gray; contains fine to coarse sand	48.0	50.5
Sand and gravel, principally dark colored silicates, texture grades from medium sand to coarse gravel	50.5	54.0
Clay, medium gray	54.0	55.0
Clay, silty to sandy, slightly to moderately calcareous, medium gray	55.0	57.0
Clay, medium brownish gray	57.0	63.5
Till; clay, silty to slightly sandy and gravelly, moderately calcareous, medium gray	63.5	72.4

Clay, very silty, moderately calcareous, medium gray	72.4	72.8
Till; clay, silty to slightly sandy and gravelly, moderately calcareous, medium gray.....	72.8	79.0

Cretaceous System - Upper Cretaceous Series - Colorado Group:
Niobrara Formation:

Shale, chalky, to chalk, shaley; light gray.....	79.0	84.5
Chalk, in part shaley, light gray to white.....	84.5	85.0
Chalk, shaley, to shale, chalky; light gray.....	85.0	100.0

Test Hole #5-GT-80
(26N-3E-14acda)
Wayne County

Location: NE SE SW NE Sec. 14, T. 26N., R. 3E., approximately 2115 feet south and 1,336 feet west of the northeast corner.
Ground elevation: 1,498 ft. (t). (Wayne, 7.5 min. quadrangle)
Depth to water: Unknown.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil; dark yellowish brown, very silty; contains abundant organic material	0.0	1.0
Silt, yellowish brown, very slightly clayey	1.0	20.0
Silt, yellowish brown with light reddish tint, moderately clayey	20.0	37.0
Silt, yellowish brown with red iron staining, moderately to very clayey	37.0	50.0
Silt, brown with reddish tint, moderately to very clayey	50.0	74.0
Silt, light brownish gray, very clayey	74.0	80.0
Silt, light brownish gray, slightly sandy, moderately to very clayey	80.0	82.0
Sand, light yellowish brown, coarse grained with traces of medium	82.0	85.0
Clay, light yellowish brown, slightly to very sandy.	85.0	86.0
Sand, light yellowish brown, coarse grained with traces of medium and very coarse	86.0	88.0
Clay, light yellowish brown, slightly to very sandy.	88.0	89.0
Sand, light yellowish brown, coarse sand, traces of medium and very coarse sand to fine gravel	89.0	99.0
Sand, light yellowish brown, fine grained with traces of medium to coarse; moderately to very clayey	99.0	103.0
Silt, light gray to light olive gray, moderately clayey, soft	103.0	113.0
Silt, gray, moderately clayey, soft	113.0	152.0
Silt, gray, very clayey	152.0	158.0
Sand, greenish gray, medium to coarse grained with traces of very coarse	158.0	162.0
Sand, greenish gray, very coarse with traces of fine gravel	162.0	165.0
Sand, greenish gray, medium to very coarse grained with traces of fine gravel	165.0	178.0
Sand, greenish gray, coarse to very coarse grained		

with traces of fine to medium gravel.....	178.0	181.0
Sand, greenish gray, fine to medium grained.....	181.0	186.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, soft; top 4 ft, weathered.....	186.0	205.5
Shale, dark gray, soft; contains very thinly bedded limestones, light tan, very finely crystalline....	205.5	265.0
Shale, dark gray, soft; contains very thinly bedded limestones, dark gray, very finely crystalline....	265.0	300.0
Shale, dark gray, soft, limy; contains sand, very fine grained from 317 to 318 ft.....	300.0	320.0
Shale, dark gray, soft; contains very thin inter-bedded sand, sand is very fine.....	320.0	370.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Limestone, dark grayish brown, very finely to finely crystalline, impure; contains pelecypods and crystalline calcite in part; slightly to moderately shaley lower 8 ft.....	370.5	392.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Graneros Formation:		
Shale, dark gray, soft, slightly limy.....	392.5	405.0
Shale, dark gray, soft; slightly to moderately limy from 420 to 425.5 ft.....	405.0	425.5
Limestone, dark olive gray, finely crystalline, impure; contains pyrite.....	425.5	426.0
Shale, dark gray soft, limy.....	426.0	429.0
Limestone, dark olive gray, finely crystalline, impure; contains pelecypods.....	429.0	430.0
Shale, dark gray, soft, limy.....	430.0	431.5
Limestone, dark olive gray, finely crystalline, impure.....	431.5	433.0
Shale, dark gray, soft, limy.....	433.0	440.0
Shale, dark gray, soft, very slightly to slightly limy.....	440.0	451.0
Cretaceous System - Lower Cretaceous Series - Dakota Group:		
Sand, dark olive gray, very fine grained; very shaley.....	451.0	460.0
Sandstone, dark olive gray, very fine to fine grained; very shaley.....	460.0	465.0
Shale, dark olive gray, slightly to moderately sandy, sand very fine grained; very sandy from 473 to 475 ft; limy from 471 to 471.5 ft, 477 to 477.1 ft, and 477.5 to 477.6 ft.....	465.0	480.0
Sandstone, dark grayish brown, very fine grained, shaley; very tightly cemented from 491 to 492 ft..	480.0	493.0
Shale, dark olive gray, soft; contains sand to		

sandstone, very fine grained, from 498 to 502.5 ft.....	493.0	504.0

Test Hole #37-A-51
(26N-3E-22cbbc)
Wayne County

Location: SW NW NW SW Sec. 22, T. 26N., R. 3E., approximately 2073 feet north and 30 feet east of southwest corner.
Ground elevation: 1,593 ft. (t). (Wayne, 7.5 min. quadrangle)
Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, medium dark brown to brown...	0.0	0.5
Silt, slightly clayey, dark grayish brown to reddish brown.....	0.5	1.0
Silt, slightly clayey, granular in part, dark brown.	1.0	2.0
Silt, slightly clayey, reddish brown to brownish yellow.....	2.0	5.0
Silt, slightly clayey, slightly calcareous, in part medium brown; moderately calcareous below 10 ft; dark brown from 10 to 13.5 ft.....	5.0	18.0
Silt, slightly clayey, moderately calcareous, medium yellowish brown with iron stains; from 20 to 22.5 ft, medium brown; below 22.5 ft moderately clayey, yellowish brown to grayish brown.....	18.0	24.0
Silt, slightly clayey, moderately calcareous, medium dark yellowish brown to grayish brown; from 28 to 28.5 ft, medium yellowish brown to grayish brown..	24.0	31.0
Silt, moderately clayey, slightly sandy to 33 ft, moderately calcareous, yellowish brown to grayish brown; sand is very fine; below 33 ft dark yellowish brown.....	31.0	34.3
Silt, moderately clayey, moderately calcareous, light medium yellowish brown to grayish brown; below 40 ft, medium dark yellowish brown; below 43.1 ft, slightly calcareous, some iron stain.....	34.3	45.0
Silt, slightly clayey, slightly calcareous, mottled gray and brown, some yellowish brown.....	45.0	47.0
Silt, moderately clayey, medium dark grayish brown; some iron staining to 47.4 ft; below 47.4 ft, dark brownish gray; below 48 ft, dark brownish gray....	47.0	50.0

Test Hole #38-A-51
(26N-3E-22cbbc)
Wayne County

Location: SW NW NW SW Sec. 22, T. 26 N., R. 3 E., approximately 2,065 feet north and 5 feet east of southwest corner.
Ground elevation: 1,593 ft. (t). (Wayne, 7.5 min. quadrangle)
Depth to water: 50.1 ft. (9-28-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, dark brown	0.0	1.5
Silt, slightly clayey, medium brown; slightly calcareous below 6 ft	1.5	13.0
Silt, in part slightly to moderately clayey, moderately calcareous, medium brownish gray	13.0	41.5
Silt, slightly clayey, medium yellowish gray to medium brownish gray	41.5	48.0
Silt, soil-like, dark brownish gray	48.0	49.2
Silt, moderately clayey, dark brownish gray	49.2	50.2
Silt, very clayey, to clay, very silty; medium brownish gray to medium brown	50.2	57.5
Silt, very clayey to moderately sandy, medium brownish gray; contains fine to medium sand	57.5	58.8
Clay, very silty to moderately sandy, medium brownish gray; contains very fine to coarse sand	58.8	61.0
Silt, moderately clayey, medium brownish gray	61.0	62.0
Silt, very clayey to moderately sandy, medium yellowish gray; contains fine to very coarse sand.	62.0	66.0
Sand and gravel, quartz and dark colored silicates, texture grades from medium sand to medium gravel	66.0	66.7
Silt, very clayey	66.7	67.2
Sand and gravel, very coarse sand to medium gravel	67.2	67.5
Silt, very clayey, light gray	67.5	68.1
Silt, slightly clayey to slightly sandy, light gray with blue tint; contains very fine to medium sand.	68.1	71.5
Silt, moderately clayey to slightly sandy, moderately calcareous, light greenish gray; contains fine to coarse sand	71.5	72.6
Sand and gravel, principally clay fragments, moderately calcareous; texture grades from medium sand to medium gravel	72.6	74.1
Till; silt, very clayey to slightly sandy and pebbly, moderately calcareous, medium yellowish gray with dark brown stain; contains more sand from 99 to 102 ft; medium gray below 104.5 ft.	74.1	147.0
Sand, silty, texture grades from very fine to fine	147.0	150.0

Silt, slightly clayey to very sandy, slightly to moderately calcareous, medium brownish gray; contains very fine to fine sand.....	150.0	158.0
Clay, very silty to slightly sandy, medium gray.....	158.0	158.2
Silt, slightly clayey to slightly sandy, slightly calcareous, medium gray; contains very fine to fine sand.....	158.2	159.0
Silt, moderately clayey to very sandy, slightly calcareous, medium gray; contains very fine to fine sand; very sandy below 160 ft.....	159.0	163.8
Silt, slightly clayey to very sandy, slightly calcareous, light gray; contains fine to medium sand.	163.8	164.2
Sand, green silicates, slightly to moderately calcareous; texture grades from medium to very coarse sand with a trace of fine gravel.....	164.2	165.0
Sand and gravel, quartz, pink feldspar and chalk fragments; slightly to moderately calcareous, texture grades from medium sand to medium gravel.....	165.0	176.5
Clay, very silty, medium yellowish gray.....	176.5	177.5
Sand, quartz and pink feldspar, texture grades from fine to very coarse sand with a trace of gravel...	177.5	194.0
Sand, slightly silty, texture of sand grades from very fine to medium.....	194.0	210.5
Sand, fine to very coarse sand with a trace of fine gravel.....	210.5	226.8
Clay, very silty to moderately sandy, light gray with yellow tint; contains fine to medium sand....	226.8	227.2
Sand and gravel, medium sand to fine gravel.....	227.2	230.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, white to light gray.....	230.0	232.0
Shale, chalky, medium gray.....	232.0	238.5
Shale, chalky, to chalk, shaley; medium to dark gray.....	238.5	245.5
Chalk, white to light gray.....	245.5	250.0

Test Hole #39-A-51
(26N-3E-33addd)
Wayne County

Location: SE SE SE NE Sec. 33, T. 26 N., R. 3 E., approximately 2,375 feet south and 5 feet west of northeast corner.
Ground elevation: 1,491 ft. (a). (Wayne, 7.5 min. quadrangle)
Depth to water: 12.2 ft. (9-28-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.2
Silt, slightly clayey, dark brownish gray to black; moderately to very clayey below 5 ft; medium brownish gray below 10 ft	2.2	23.0
Silt, slightly clayey, medium yellowish brown	23.0	32.5
Sand and gravel, quartz and calcareous fragments, very calcareous; texture grades from fine sand to fine gravel; contains thin layers of silt	32.5	44.0
Silt, very sandy, moderately calcareous, light gray; contains very fine to fine sand	44.0	44.5
Sand and gravel, iron-stained; texture grades from fine sand to medium gravel	44.5	49.0
Till; clay, silty to slightly sandy and pebbly, moderately calcareous, medium gray	49.0	67.0
Clay, very sandy, slightly calcareous, light gray; contains very fine to medium sand	67.0	69.5
Silt, very clayey to slightly sandy, moderately calcareous, medium gray; contains very fine to medium sand	69.5	71.8
Clay, very silty to very sandy, moderately calcareous, medium gray; contains very fine sand	71.8	73.5
Till; silt, very clayey to slightly sandy, slightly calcareous, medium gray; contains very fine to medium sand	73.5	78.5
Sand, quartz and bluish green silicates, slightly calcareous, sand is very fine to coarse with a trace of very coarse; slightly coarser and contains some pink feldspars below 80 ft	78.5	85.0
Sand and gravel, slightly calcareous, texture grades from medium sand to fine gravel	85.0	93.0
Sand and gravel, medium sand to fine gravel with some medium gravel; contains many chalk fragments.	93.0	103.0
Cretaceous Series - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, white to light gray	103.0	104.5
Shale, light gray, very chalky	104.5	107.0

Chalk, white to light gray, shaley.....	107.0	108.5
Shale, medium to dark gray, chalky; contains some white to light gray shaley chalk.....	108.5	131.0

Test Hole #32-A-51
(26N-4E-1aaad)
Wayne County

Location: SE NE NE NE Sec. 1, T. 26 N., R. 4 E., approximately 546 feet south and 8 feet west of northeast corner.
Ground elevation: 1,474 ft. (t). (Wakefield SW, 7.5 min. quadrangle)
Depth to water: 54.1 ft. (9-12-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.5
Silt, slightly to moderately clayey, medium yellowish brown	1.5	2.5
Silt, slightly clayey, medium brown; moderately calcareous below 5 ft	2.5	17.5
Silt, slightly clayey to very sandy, light yellowish brown; contains fine to medium sand	17.5	20.0
Silt and sand, interbedded; moderately calcareous, light yellowish brown; contains very fine to coarse sand	20.0	25.0
Silt, slightly clayey to slightly sandy, very calcareous, medium yellowish brown; contains very fine to medium sand; dark brownish gray below 30 ft	25.0	33.0
Silt, slightly clayey, moderately calcareous, medium brown	33.0	33.5
Silt, slightly to moderately clayey, moderately calcareous, medium brownish gray to medium brown; contains very fine to fine sand below 44.5 ft	33.5	48.0
Till; silt, clayey to sandy and gravelly, moderately to very calcareous, light yellow; light brownish gray below 58 ft; medium gray below 87.5 ft	48.0	105.0
Till; clay, silty to sandy and gravelly, moderately to very calcareous, medium gray	105.0	145.0
Silt, slightly clayey, very calcareous, medium yellowish gray	145.0	145.2
Sand, quartz, light brown silicates and pink feldspars, texture grades from fine to very coarse with some fine gravel; contains a few chalk fragments below 165 ft	145.2	180.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium to dark gray, very clayey to slightly silty, moderately calcareous	180.0	200.0

Test Hole #33-A-51
(26N-4E-4aaaa)
Wayne County

Location: NE NE NE NE Sec. 4, T. 26 N., R. 4 E., approximately 99 feet south and 5 feet west of northeast corner.
Ground elevation: 1,415 ft. (t). (Wakefield SW, 7.5 min. quadrangle)
Depth to water: 11.5 ft. (9-12-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and soil; silt, moderately clayey, dark gray	0.0	1.5
Silt, moderately to very clayey, dark gray	1.5	10.0
Silt, slightly to moderately clayey, slightly to moderately calcareous, medium brownish gray; contains many gastropods	10.0	19.5
Silt, very clayey, dark gray	19.5	22.0
Silt, slightly to moderately clayey, medium greenish gray	22.0	26.5
Silt, slightly clayey, light bluish gray; contains some very fine sand in lower part	26.5	31.5
Sand and gravel, quartz and dark colored silicates, moderately calcareous; texture grades from fine sand to fine gravel	31.5	42.0
Sand and gravel, light brown and light green silicates, moderately calcareous; texture grades from fine sand to medium gravel, 20 percent gravel	42.0	49.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Clay, slightly silty, medium gray	49.0	55.0
Shale, medium gray, very clayey to slightly silty; contains some thin calcareous layers below 57 ft	55.0	59.0
Shale, dark gray, very clayey to slightly silty; contains thin calcareous layers and very fine sandstone below 60 ft	59.0	61.0
Shale, medium to dark gray, very clayey	61.0	80.0

Test Hole #29-A-51
(26N-5E-22addd)
Wayne County

Location: SE SE SE NE Sec. 22, T. 26 N., R. 5 E., approximately 1,500 feet south and 2 feet west of northeast corner.
Ground elevation: 1,433 ft. (a). (Altona NE, 7.5 min. quadrangle)
Depth to water: 67.8 ft. (9-6-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	0.5
Silt, slightly clayey, dark brown	0.5	2.0
Silt, moderately clayey, medium yellowish brown	2.0	4.0
Silt, slightly clayey, light brownish yellow to light brownish gray; moderately calcareous below 10 ft; contains a trace of very fine to fine sand from 35 to 42.5 ft	4.0	50.0
Silt, slightly clayey, light gray; light brownish gray below 51.5 ft	50.0	54.0
Clay, moderately to very silty, light brown	54.0	56.5
Clay, slightly silty, light brown	56.5	60.0
Silt, moderately clayey, light grayish brown to light yellowish brown; very clayey from 61 to 64 ft	60.0	65.0
Silt, slightly clayey, light yellowish brown	65.0	85.0
Clay, moderately silty to sandy and gravelly, light gray to light brownish gray	85.0	93.0
Sand and gravel, quartz and pink feldspar, texture grades from fine sand to medium gravel	93.0	99.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium yellow, very clayey to slightly silty, moderately calcareous below 100 ft	99.0	103.5
Shale, dark gray, very clayey to slightly silty, very calcareous	103.5	114.2
Limestone, dark gray, shaley	114.2	114.5
Shale, dark gray, very clayey to slightly silty, very calcareous	114.5	120.0

Test Hole #6-A-52
(27N-1E-18cccc)
Wayne County

Location: SW SW SW SW Sec. 18, T. 27 N., R. 1 E., approximately 8 feet north and 293 feet east of southwest corner.
Ground elevation: 1,828 ft. (t). (Randolph South, 7.5 min. quadrangle)
Depth to water: 33.0 ft. (7-23-52)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill; silt, slightly clayey, moderately calcareous, medium yellowish gray.....	0.0	1.5
Soil; silt, slightly clayey, slightly calcareous, medium brownish gray.....	1.5	2.0
Silt, slightly clayey, moderately calcareous, medium brownish yellow to medium yellowish gray.....	2.0	39.0
Till; clay, slightly silty to moderately sandy, moderately calcareous, medium yellowish gray.....	39.0	50.0
Clay, moderately silty to sandy, moderately calcareous, medium yellowish gray.....	50.0	52.5
Till; clay, silty to sandy, moderately calcareous, medium yellowish gray with iron stain; in part medium gray below 97.5 ft.....	52.5	136.0
Sand, clayey to silty, moderately calcareous, light yellowish gray; texture grades from very fine to medium.....	136.0	140.0
Sand, very silty, moderately calcareous; texture grades from very fine to coarse.....	140.0	142.0
Till; clay, silty to pebbly, moderately calcareous, medium yellowish gray; medium gray below 147 ft...	142.0	156.5
Silt, moderately clayey to sandy, moderately calcareous, medium olive gray; contains very fine sand..	156.5	163.0
Sand and gravel, quartz, dark colored silicates, sandstone and chalk fragments; texture grades from medium sand to coarse gravel, 75 percent gravel.....	163.0	165.1
Till; clay, silty to sandy, moderately calcareous, medium gray; contains non-calcareous bluish green clay from 187 to 187.5 ft; contains fine to coarse sand from 206.8 to 207.5 ft.....	165.1	280.0
Sand and gravel, quartz and pink and yellow silicates; texture grades from medium sand to fine gravel with some medium gravel, 30 percent gravel; contains 10 percent gravel below 285 ft.....	280.0	300.0
Sand, fine to very coarse with a trace of fine		

gravel; contains silt from 313 to 313.3 ft. and a thin layer at 325.5 ft.....	300.0	336.0
Silt, moderately clayey to slightly sandy, light yellowish gray; contains very fine sand.....	336.0	340.0
Silt, in part moderately clayey, moderately calcareous, light reddish brown.....	340.0	345.0
Silt, slightly clayey, medium reddish brown; slightly calcareous from 345 to 350 ft; contains very fine to medium sand in lower part.....	345.0	352.0
Sand, in part silty, quartz; texture grades from very fine to medium with some coarse sand; more silty below 360 ft.....	352.0	366.5
Tertiary System - Miocene Series - Ogallala Group:		
Clay, in part silty, light gray to light brownish gray; contains a trace of very fine to fine sand below 408 ft; contains some calcareous fragments below 410 ft.....	366.5	415.0
Silt, very clayey to slightly sandy, moderately calcareous, light brownish gray.....	415.0	417.0
Silt, very clayey to slightly sandy, interbedded with silt, very clayey to very sandy; contains very fine to medium sand; slightly calcareous below 420 ft.....	417.0	423.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, white with yellowish brown stain.....	423.0	430.0
Shale, medium gray with white specks, chalky.....	430.0	440.0

Test Hole #18-A-52
(27N-3E-16dddd)
Wayne County

Location: SE SE SE SE Sec. 16, T. 27 N., R. 3 E., approximately 87 feet north and 24 feet west of southeast corner.
Ground elevation: 1,568 ft. (t). (Laurel SE, 7.5 min. quadrangle)
Depth to water: 46.0 ft. (8-22-52)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil; silt, moderately clayey, moderately calcareous, medium brownish gray.....	0.0	1.0
Silt, slightly clayey, moderately calcareous, medium yellowish gray; contains some calcareous nodules in upper part.....	1.0	23.5
Silt, moderately clayey to slightly sandy, moderately calcareous, medium yellowish gray; contains very fine to medium sand.....	23.5	27.5
Silt, moderately clayey, moderately calcareous, medium yellowish gray.....	27.5	30.0
Silt, slightly clayey, slightly to moderately calcareous, medium yellowish gray; non-calcareous below 32.5 ft.....	30.0	34.0
Silt, slightly clayey, soil-like, medium brownish gray.....	34.0	34.5
Silt, moderately clayey, medium brownish gray to medium brown.....	34.5	40.0
Clay, slightly silty, medium brown; medium yellowish gray below 41.5 ft.....	40.0	45.0
Till; silt, very clayey to slightly sandy, light gray; contains fine to coarse sand; slightly calcareous below 48 ft; contains calcareous nodules below 49 ft.....	45.0	50.0
Till; clay, slightly silty to slightly sandy, moderately calcareous, medium yellowish gray to medium brownish gray; contains calcareous nodules from 50 to 53 ft.....	50.0	61.5
Gravel and pebbles, moderately calcareous; contains many limestone fragments.....	61.5	61.6
Till; clay, moderately silty to sandy, moderately calcareous, light olive gray; contains fine to coarse sand.....	61.6	62.2
Till; silt, very clayey to slightly sandy, moderately calcareous, light yellowish gray with brownish yellow stain; contains thin layers of gravel below 67 ft.....	62.2	69.0

Till; silt, very clayey, moderately calcareous, medium yellowish gray	69.0	70.0
Sand and gravel, medium sand to fine gravel	70.0	70.4
Till; silt, very clayey to slightly sandy, moderately calcareous, medium olive gray	70.4	76.0
Till; clay, very silty to slightly sandy and gravelly, moderately calcareous, medium gray; contains some medium olive gray stain from 76 to 87.5 ft.; contains sand and gravel from 97.5 to 98 ft	76.0	105.0
Silt, very clayey, moderately calcareous, medium gray	105.0	105.5
Till; clay, silty to sandy, moderately calcareous, medium gray	105.5	105.9
Sand, fine to very coarse, contains a trace of gravel and pebbles	105.9	108.7
Till; clay, silty to sandy, moderately calcareous, medium gray	108.7	130.5
Silt, very clayey to moderately sandy, slightly calcareous, medium yellowish gray; contains fine to coarse sand	130.5	131.0
Sand, quartz and pink feldspar, texture grades from fine to very coarse	131.0	145.0
Sand and gravel, fine sand to fine gravel with a trace of medium gravel	145.0	150.0
Sand, fine to very coarse with a trace of fine gravel	150.0	160.0
Sand and gravel, medium sand to fine gravel with some medium gravel; contains silt at 165 ft	160.0	176.4
Silt, clayey to sandy, slightly calcareous, light yellowish gray; contains very fine to fine sand	176.4	183.0
Sand, very silty, to silt, very sandy; slightly calcareous, light yellowish gray; contains very fine to medium sand	183.0	185.0
Sand, very fine to fine with some medium	185.0	189.5
Silt, slightly clayey to slightly sandy, slightly to moderately calcareous, light yellowish gray; contains very fine to fine sand; interbedded with sand below 202.5 ft	189.5	205.0
Sand and gravel, quartz and pink feldspar, texture grades from fine sand to fine gravel, 20 percent gravel	205.0	214.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, shaley, light gray to white	214.5	215.5
Shale, white to medium gray, chalky; to chalk, shaley	215.5	230.0

Test Hole #46-A-51
(27N-3E-31cccc)
Wayne County

Location: SW SW SW SW Sec. 31, T. 27 N., R. 3 E., approximately 94 feet north and 9 feet east of southwest corner.
Ground elevation: 1,551 ft. (t). (Carroll 7.5 min. quadrangle)
Depth to water: 19.6 ft. (11-2-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, medium brownish gray.....	0.0	2.0
Silt, slightly clayey, slightly calcareous, medium yellowish gray.....	2.0	3.5
Silt, granular, dark brownish gray.....	3.5	4.5
Silt, slightly to moderately clayey, medium yellowish gray; slightly calcareous below 6.5 ft.....	4.5	39.5
Silt, moderately clayey, slightly calcareous, medium brownish gray; medium gray below 41 ft; very clayey below 46.5 ft.....	39.5	47.5
Clay, moderately silty, medium gray; very silty from 52 to 57 ft.....	47.5	58.5
Clay, slightly silty, light gray with a blue tint...	58.5	64.5
Silt, very clayey, to clay, very silty; light gray with blue tint; slightly sandy below 69 ft.....	64.5	70.5
Sand and gravel, fine sand to medium gravel; contains many green and dark colored silicates....	70.5	73.5
Clay, silty to moderately sandy, medium yellow gray.	73.5	73.7
Sand, quartz and pink feldspar, texture grades from fine to very coarse; contains silt from 80.8 to 81.1 ft. and from 85.5 to 85.6 ft.....	73.7	92.5
Sand, very fine to coarse with some very coarse; contains some green silicates.....	92.5	100.0
Sand, fine to very coarse.....	100.0	116.3
Silt, slightly clayey to sandy, slightly calcareous, medium yellowish gray.....	116.3	116.5
Sand and gravel, quartz and pink feldspar, in part iron-stained; texture grades from fine sand to medium gravel.....	116.5	145.0
Sand and gravel, medium sand to medium gravel; slightly coarser texture below 150 ft; contains chalk boulder at 153.2 ft.....	145.0	156.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light to medium gray, chalky.....	156.0	174.0
Chalk, light gray, shaley.....	174.0	180.0